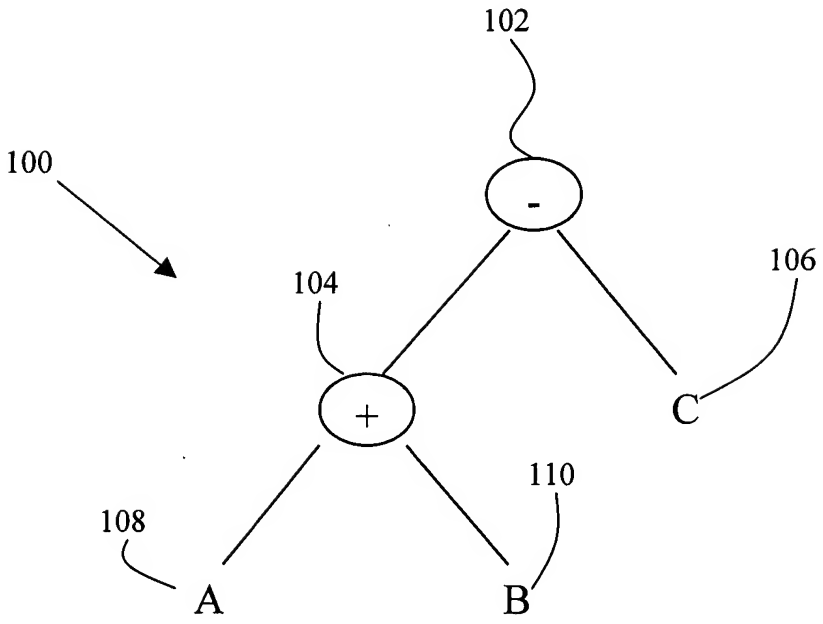


Fig. 1

Fig. 2

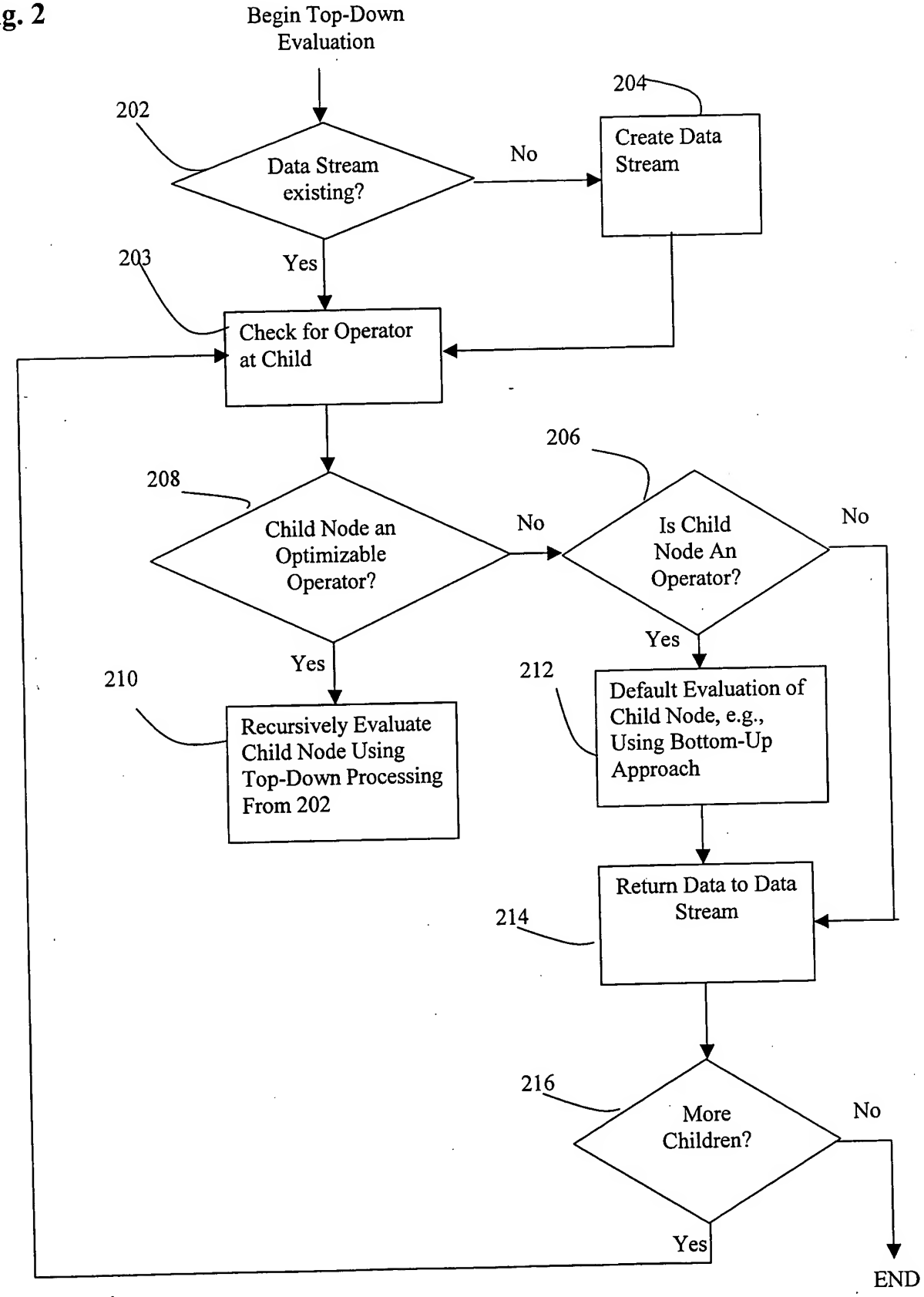

Begin Top-Down Evaluation
202
Data Stream existing?
No
204
Create Data Stream
Yes
203
Check for Operator at Child
206
208
Child Node an Optimizable Operator?
No
Is Child Node An Operator?
No
Yes
Yes
210
Recursively Evaluate Child Node Using Top-Down Processing From 202
212
Default Evaluation of Child Node, e.g., Using Bottom-Up Approach
Return Data to Data Stream
214
216
More Children?
No
Yes
END

Fig. 3A

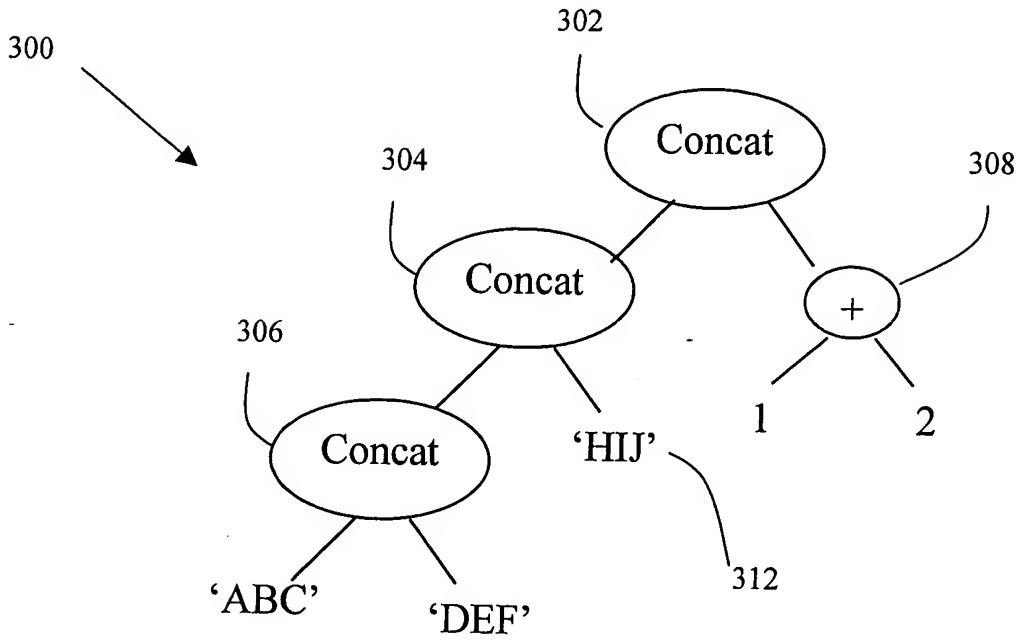


Fig. 3B

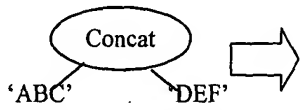
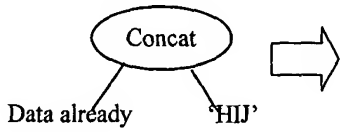
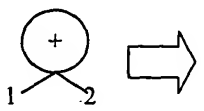
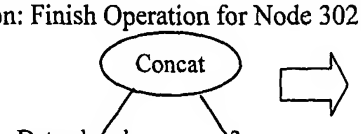
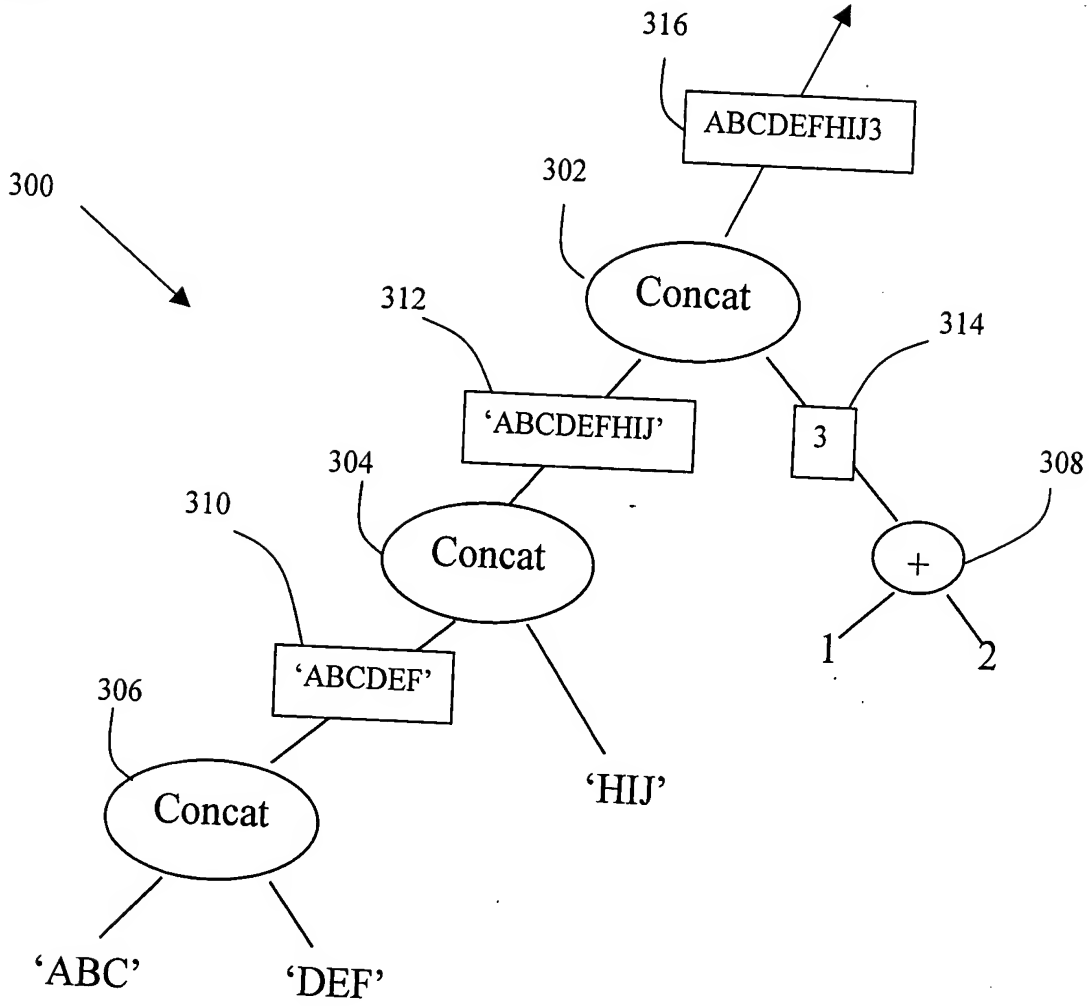
Node	Action
302	- One or more Child Operator Nodes? Answer: Yes, at Node 304 - Child Operator Node 304 eligible for Top-Down Processing? Answer: Yes Action: Proceed to Node 304 and Recursively begin process
304	- One or more Child Operator Nodes? Answer: Yes, at Node 306 - Child Operator Node 306 eligible for Top-Down Processing? Answer: Yes Action: Proceed to Node 306 and Recursively begin process
306	- One or more Child Operator Nodes? Answer: No Action: Process Operation for Node 306 and return result to stream  Action: Return back to processing for Node 304
304	- Any more Child Operator Nodes? Answer: No Action: Process Operation for Node 304 and return result to stream  Action: Return back to processing for Node 302
302	- Any more Child Operator Nodes? Answer: Yes, at Node 308 - Child Operator Node 308 eligible for Top-Down Processing? Answer: No Action: Proceed to Node 308 and Perform Bottom-Up Processing
308	Action: Process Operation for Node 308 and return result to Node 302  Action: Return back to processing for Node 302
302	Action: Finish Operation for Node 302 and return result to Stream 

Fig. 3C


316
ABCDEFHIJ3
300
302
Concat
312
314
'ABCDEFHIJ'
3
304
308
310
Concat
+
'ABCDEF'
1
2
306
'HIJ'
Concat
'ABC'
'DEF'

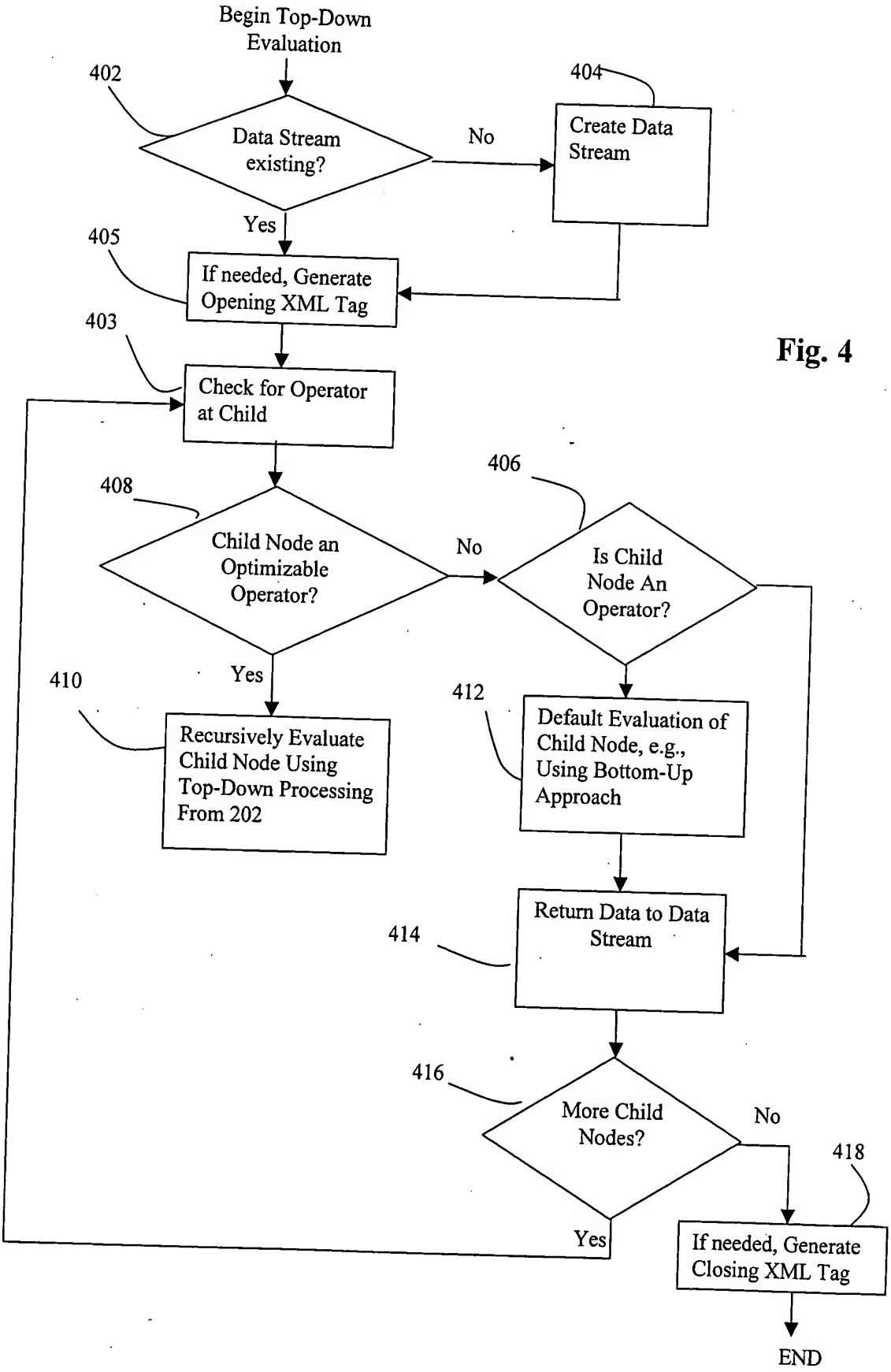

Begin Top-Down Evaluation
402
Data Stream existing?
No
404
Create Data Stream
Yes
405
If needed, Generate Opening XML Tag
403
Check for Operator at Child
408
Child Node an Optimizable Operator?
No
406
Is Child Node An Operator?
Yes
410
Recursively Evaluate Child Node Using Top-Down Processing From 202
412
Default Evaluation of Child Node, e.g., Using Bottom-Up Approach
414
Return Data to Data Stream
416
More Child Nodes?
No
418
Yes
If needed, Generate Closing XML Tag
END

Fig. 4

Fig. 5

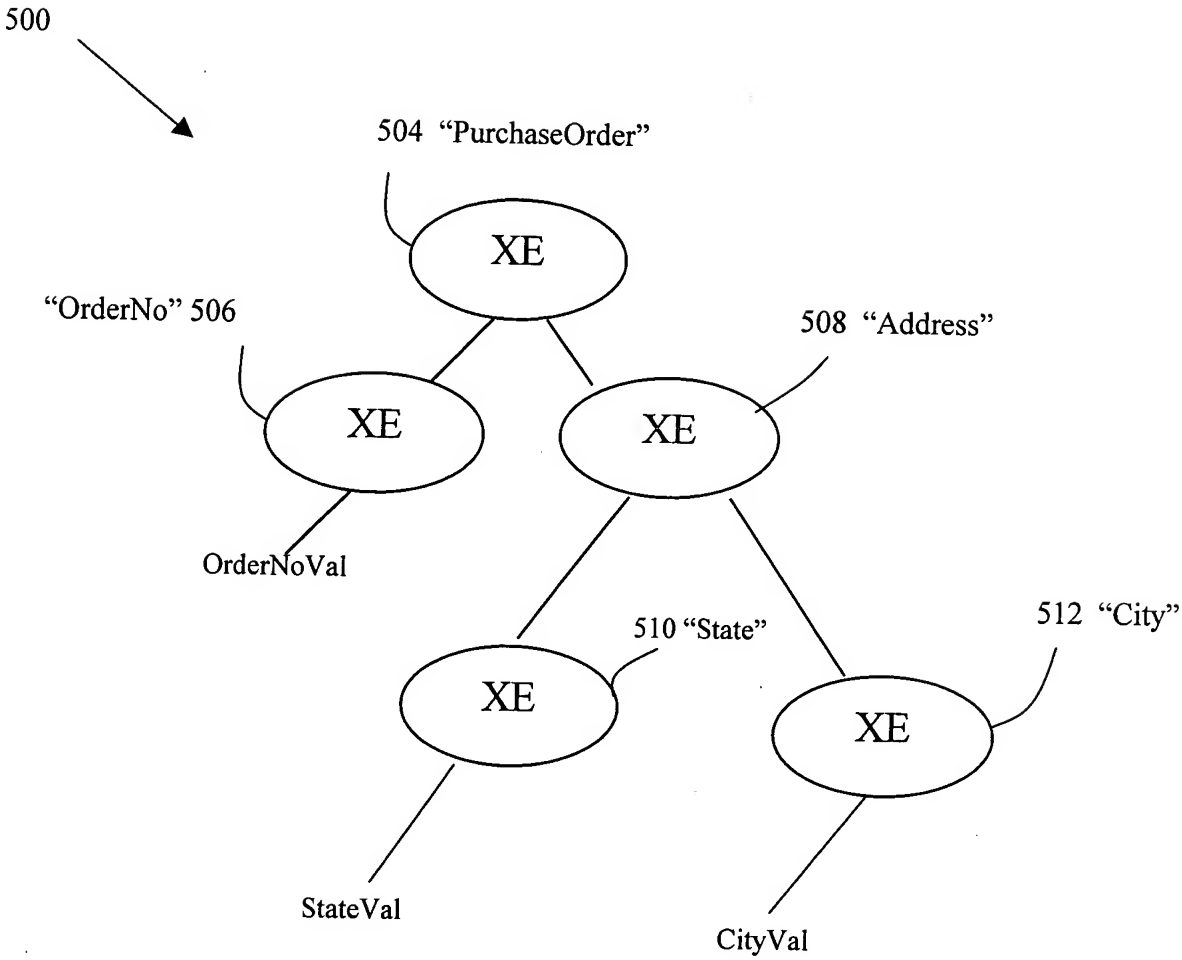
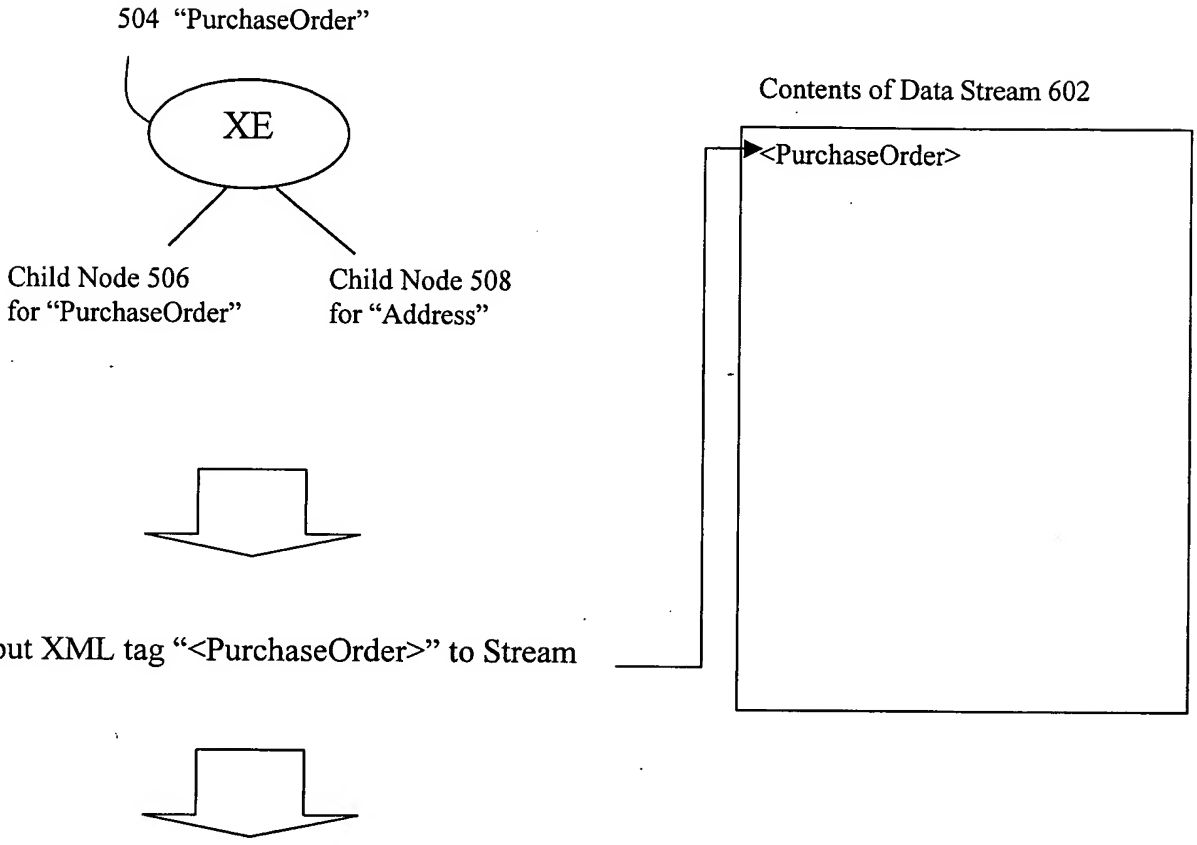

500
504 "PurchaseOrder"
XE
"OrderNo" 506
508 "Address"
XE
XE
OrderNoVal
510 "State"
512 "City"
XE
XE
StateVal
CityVal

Fig. 6A Begin Top Down Evaluation of Expression Tree 500



Proceed to Fig. 6B to Evaluate Child Node 506

Fig. 6B

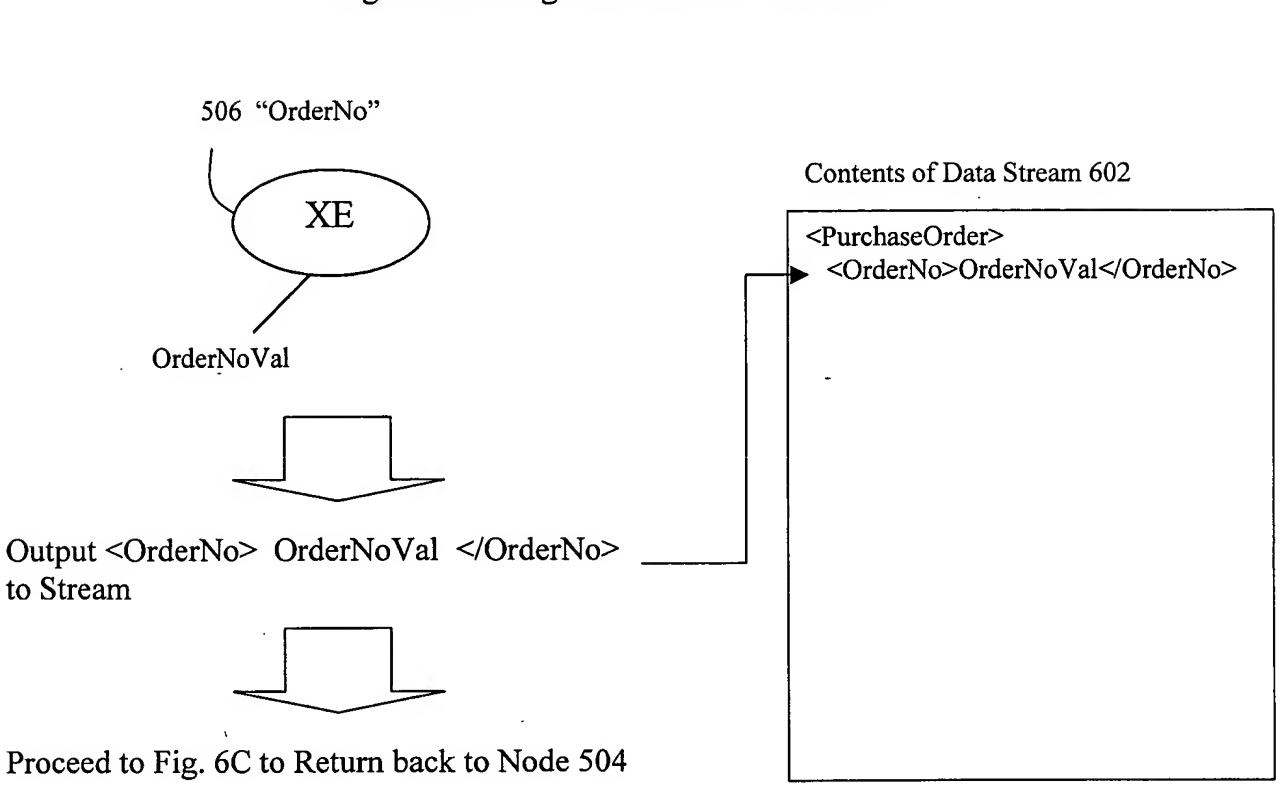
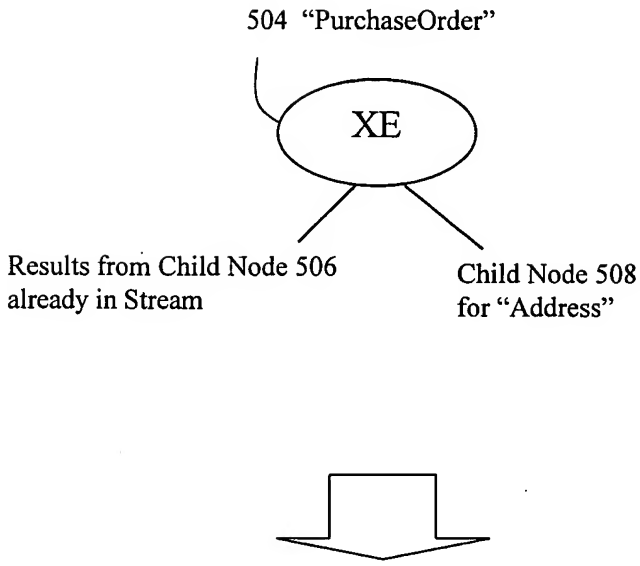

Begin Evaluating Node 506 for "OrderNo"
506 "OrderNo"
XE
OrderNoVal
Output <OrderNo> OrderNoVal </OrderNo>
to Stream
Proceed to Fig. 6C to Return back to Node 504
Contents of Data Stream 602
<PurchaseOrder>
<OrderNo>OrderNoVal</OrderNo>

Fig. 6C

Return back to Node 504 to Continue Evaluating "PurchaseOrder"

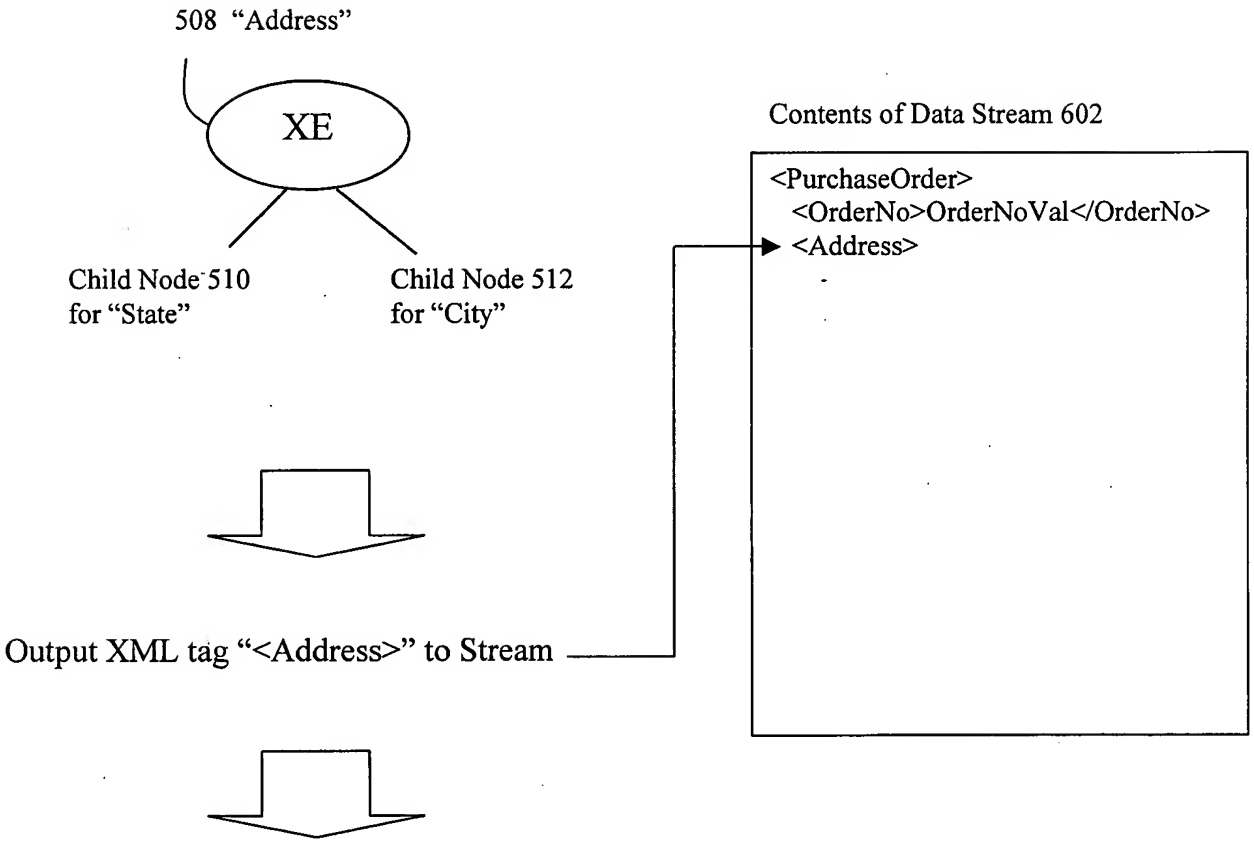


Contents of Data Stream 602

```
<PurchaseOrder>
  <OrderNo>OrderNoVal</OrderNo>
```

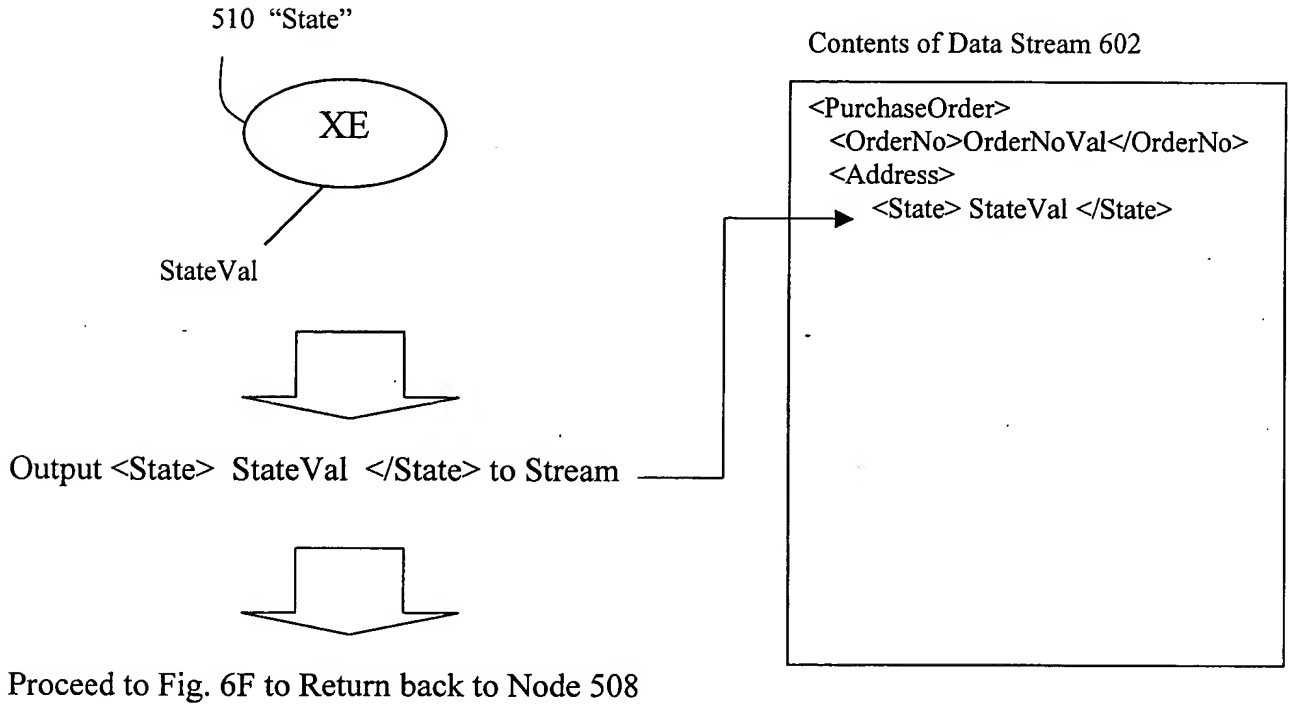
Proceed to Fig. 6D to Evaluate Child Node 508

Fig. 6D Begin Evaluating Node 508 for "Address"



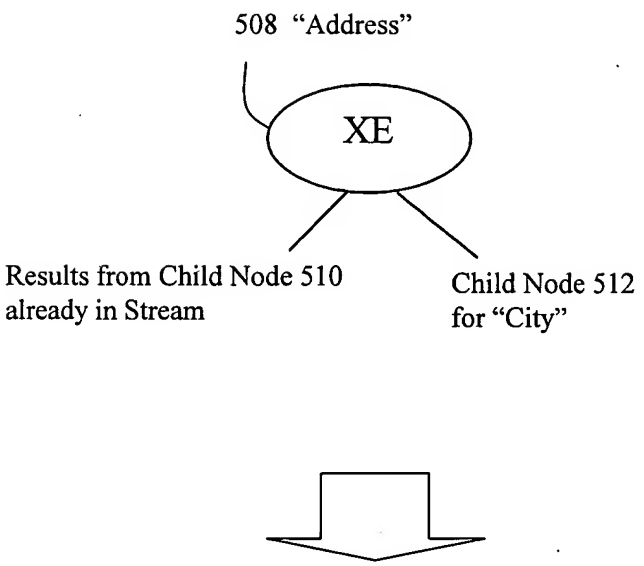
Proceed to Fig. 6E to Evaluate Child Node 510

Fig. 6E Begin Evaluating Node 510 for "State"



Proceed to Fig. 6F to Return back to Node 508

Fig. 6F Return back to Node 508 for "Address"

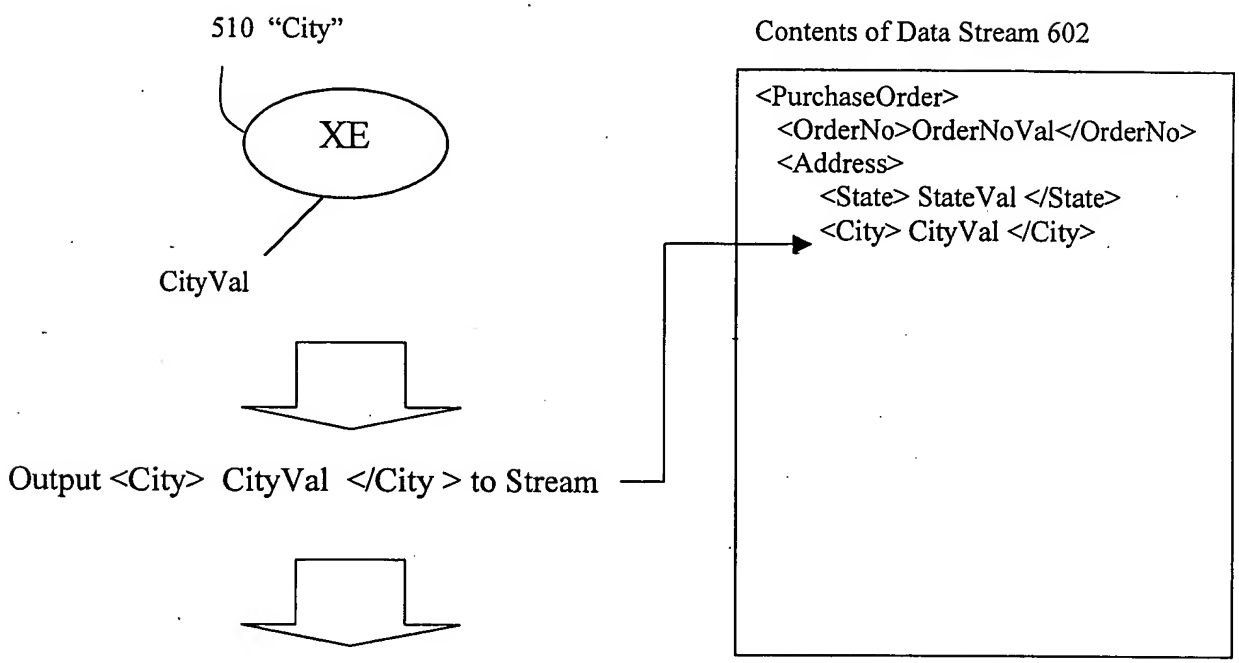


Contents of Data Stream 602

```
<PurchaseOrder>
  <OrderNo>OrderNoVal</OrderNo>
  <Address>
      <State> StateVal </State>
```

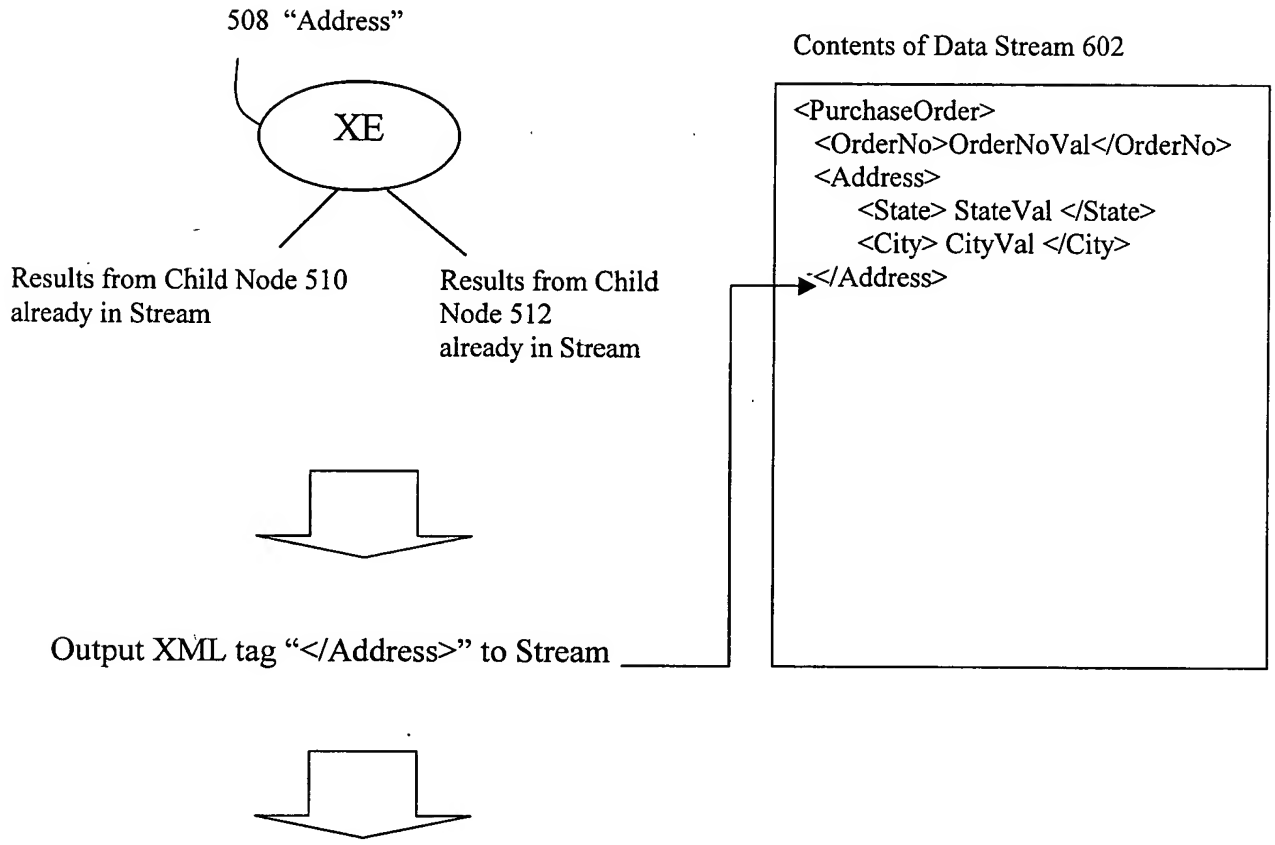
Proceed to Fig. 6G to Evaluate Child Node 512

Fig. 6G Begin Evaluating Node 512 for "City"



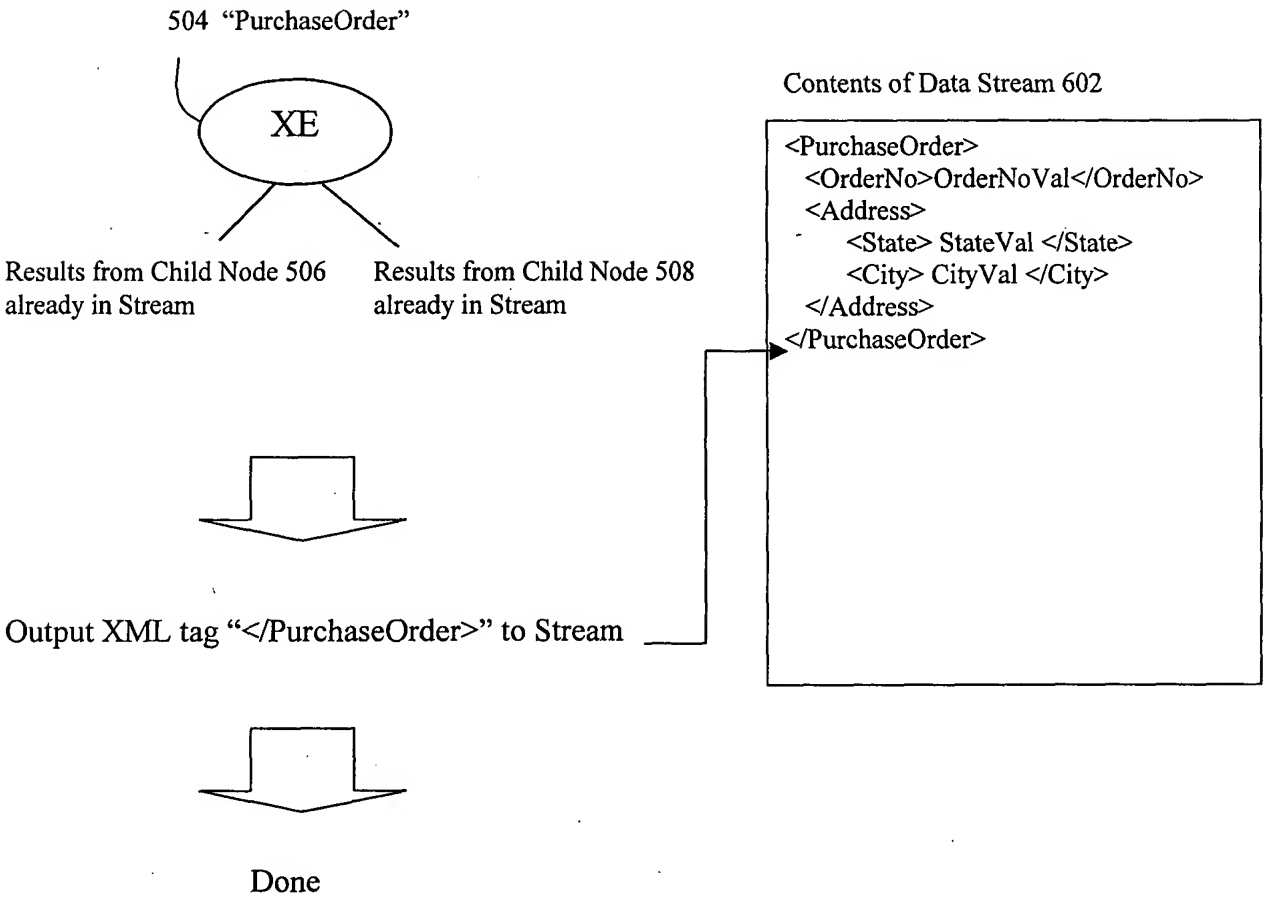
Proceed to Fig. 6H to Return back to Node 508

Fig. 6H Finish Evaluating Node 508 for "Address"



Proceed to Fig. 6I to Return back to Node 504

Fig. 6I Finish Top Down Evaluation of Expression Tree 500



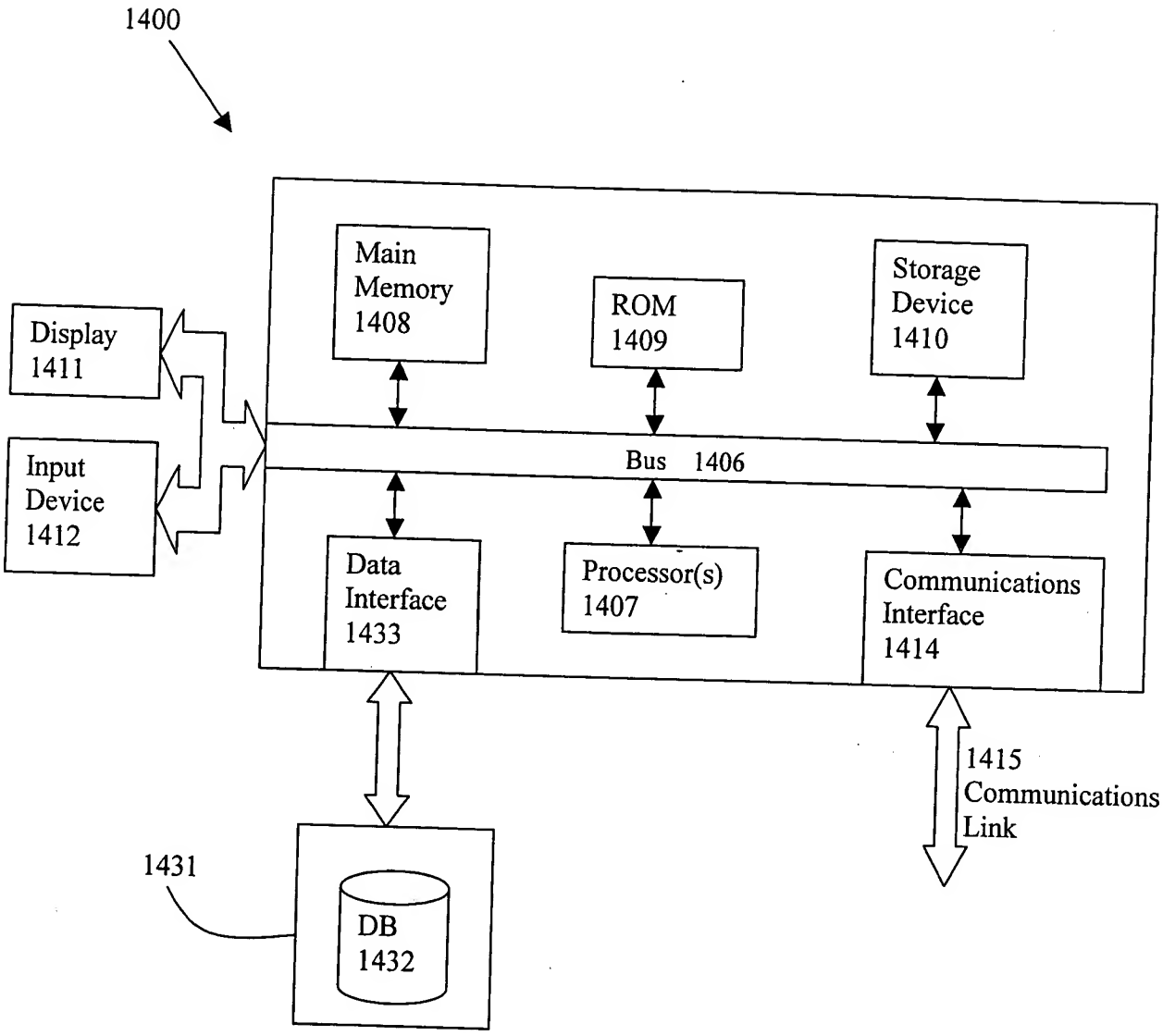

1400
Main Memory 1408
ROM 1409
Storage Device 1410
Display 1411
Input Device 1412
Bus 1406
Data Interface 1433
Processor(s) 1407
Communications Interface 1414
1415 Communications Link
1431
DB 1432

Fig. 7